In conventional needles, shown in Figures 2 and 3, the external peripheral rim 22 surrounds the entire circumference of the opening 18. Due to the angling of the end 28, the inner edge 26 of the rim 22 presents a cutting edge around the entrance of the needle 10. As is most clearly shown in Figure 3, the inner cutting edge 26 is particularly pronounced at the entrance in the rear region 27 of the end 28 of the needle 10.

Our studies and modeling have shown that in conventional needles such as those shown in Figures 1, 2, and 3, the inner edge 26 of the rim 22 causes or contributes to an increase of non-uniform fluid flow and significant gradients in normal and shear stresses at the entrance to the needle opening. Figure 15 partially illustrates the non-uniform flow of fluid at the entrance of the opening of a conventional needle around the inner edge 26.

In the present invention, as shown in Figures 4 and 5, the rim 44 and the inner edge 48 which form a cutting edge in conventional needles, is beveled back to form an internal beveled surfaced 58 that at least partially surrounds the inner periphery of the opening 40. The internal beveled surface 58 is usually located in the rear half region 52, and may extend into the front half region 50. The internal beveled surface 58 surrounds preferably five percent to eighty-five percent of the inner periphery of the opening 40, more preferably from twenty percent to seventy percent of the inner periphery of the opening 40, and most preferably from thirty percent to seventy percent of the inner periphery of the opening 40. --

Please replace the last and second to last paragraphs on page 7 with the following substituted paragraphs.

-- The internal beveled surface 58 may present a straight surface 70 as shown in Figure 12 and 13, or a convex surface curved by varying degrees toward the interior of the needle, 30 as shown in Figures 6, 8, 9, 16 and 18. The degree of beveling back is preferably at least 25% of

the thickness of the wall 70 of the needle 30, and may be 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95 or 100%. The degree of beveling back is the distance 84, as a percentage of the wall thickness, between the original external surface 80 and the original internal surface 82 at the farthest point of the beveled surface 58, as shown in Figures 6 and 12.

When the internal beveled surface 58 is curved, as may be obtained with a round-over milling cutter, a circle coincident with the curvature of the beveled portion has a radius of curvature that is preferably at least 25% of the thickness of the wall 70 of the needle, 30 and may be 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95 or 100% of the thickness of the wall of the needle. Preferably, a circle coincident with the curvature of the beveled portion has a radius of curvature that is from 30% to 100%, more preferably from 50% to 100%, and most preferably from 75% to 100% of the thickness of the wall 70 of the needle. --

Please replace the first paragraph on page 8 with the following substituted paragraph.

-- When the internal beveled surface 58 is curved, the entrance of the needle has a partial bell-mouth configuration. In this configuration, as well as when the internal beveled surface is not curved, the interior space of the needle 30 in the region of beveling is frustoconical as shown by the dotted lines 90 in Figure 20. --

IN THE DRAWING

Figure 3 has been amended in red to change the reference numeral "24" to "26" as denoted in the specification; Figure 6 has been amended in red to include the reference numeral "38" and Figure 9 has been amended to delete the reference numerals "32" and "34" the second time indicating skin portions.